

Engine and Auxiliary Systems

Edited by
Prof. Dr. A.K.M. Mohiuddin



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Chapter 18

Thermodynamic Analysis of Combustion of CAMPRO CFE Engine – Part II: Combustion Analysis

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Introduction

The main objective of this part is to perform a thermodynamic analysis of combustion CamPro CFE (Charged Forced Engine) engine to obtain its cylinder pressure data and engine losses and its efficiency. The engine is a basic turbocharger engine which has a capacity of 1561cc and installed with a Borg Warner KP39 turbocharger. The bore and stroke dimensions for CamPro CFE are 76 mm and 86 mm respectively. The compression ratio of CamPro CFE being reduced to 9.5:1 compared to NA CamPro engine.

Reference combustion pressure data are collected from simulation result of the engine in GT POWER [1]. The air flow results obtained from the GT POWER is validated using FLUENT simulation software. Then, the actual test is being conducted by using piezoelectric pressure sensor which is known as Kistler plug and the data is being recorded by using an analysis software known as OSIRIS. Once the data has been completely recorded, the data is being used for calibrating a 32-bit torque base ECU torque model. In addition, the combustion pressure data is being used in creating a better CamPro CFE engine model by using simulation software [2]

Combustion Analysis

Experimental Procedure

The test was carried out on a single cylinder of the 1.6L CamPro CFE engine. The combustion pressure was measured by installing a Kistler spark plug with integrated piezoelectric sensor into the engine cylinder #1. This type of pressure sensor enables the pressure measurement without drilling a hole. The Kistler plug is simply fitted into the spark plug boot with a special mounting socket and it is connected to a charge amplifier. These analogue signals were converted into digital signals and fed to OSIRIS evolution II rack which works as a data acquisition system.